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ABSTRACT

An experiment was conducted with twenty native French speakers using a set of four reading passages, each followed by five multiple choice comprehension questions. Each subject was tested twice when reading aloud and twice when reading silently. Other test materials included a pre-test designed to check whether certain lexical items from the reading passages were unknown to the subjects and a cloze test to provide an independent measure of the subject's English proficiency. Results confirm that: (1) silent reading is more rapid than reading aloud; (2) silent reading is a more efficient means to comprehension; and (3) divided attention, due to the added task of articulation, causes reading aloud to be less efficient. There are important differences between reading aloud and silent reading in regard to how much meaning each yields. Within each mode there are variations governed by the reader's purpose. Reading pedagogy in schools typically ignores silent reading skills such as scanning, search reading, skimming, receptive reading, and responsive reading. The awareness of the differences noted would do much to improve the effectiveness of reading instruction. Appendices include test materials, correct answers, item analyses, an example of test procedure, and notes on statistical techniques used. (JK)

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ASPECTS OF THE READING PROCESS

Reading Comprehension in Adult (French) Learners of English as a Foreign Language: A Comparison of Reading Aloud and Silent Reading

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June, 1977

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Speaking of St Ambrose, St Augustine says:
' When he read, his eyes were drawn down the page and his mind was sifting the material, but his voice and tongue were silent.... I saw him reading silently, and to my knowledge, he never read any other way'. [1]

PREFACE

I would like to thank my supervisor, Mrs E. Harding, for giving a great deal of time to discussion of this dissertation and for her valuable guidance. I am also grateful to Dr P. Altham, University Statistical Laboratory, for advice on statistical techniques, the Principals of several Cambridge language schools for help in obtaining Subjects for the experiment, and the students who took part in the reading tests.

The chief source of information for this dissertation was the experiment described and discussed in Sections III to VII. Other sources are acknowledged in the text, References and Bibliography.

The full sets of tape-recorded readings and answer sheets are available on request.

DECLARATION

This dissertation is submitted in partial fulfilment of the requirements for the Diploma in Linguistics. I certify that, excluding tabular matter and Appendices, it does not exceed the prescribed limit of 15,000 words.

Lionel Menasche

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Section I INTRODUCTION

HISTORICAL BACKGROUND

It is observed by Kelly, in his history of language teaching, that there exists little evidence of an awareness before the twentieth century of differences between oral and silent reading. What is clear from early records, however, is that reading aloud was regarded as the norm in those situations where some awareness of a difference did exist, whilst any 'silent' use of language was regarded with suspicion by the ancients. In mediaeval times monks had to be isolated in carrels when reading, though they otherwise led an almost completely communal life. In Roman times there is only one recorded reference to silent reading, the tone of which indicates that it was a remarkable skill - St Augustine writes of St Ambrose: 'When he read, his eyes were drawn down the page and his mind was sifting the material, but his voice and tongue were silent.... I saw him reading silently, and to my knowledge, he never read any other way'[1]. During the Renaissance and until the nineteenth century, reading continued to be regarded as an oral activity, which, says Kelly, 'was usually taken as propaedeutic to memorization work, an attitude which reached its zenith during the eighteenth century'[2].

Although Kelly states of silent reading that 'we do not even know when it became common, let alone usual', it is in fact possible to locate these developments in the nineteenth century. Pugh observes that silent reading became commonplace during this period because the social, cultural and technological changes of the century greatly altered what the term 'reading' connoted. Most adult reading tasks themselves changed in character as a result of increased literacy, the flourishing of private reading in public places (such as railway carriages, offices and libraries) and the greatly increased volume and variety of reading matter (such as newspapers).

The present century has seen silent reading become the norm, the

bulk of what is written being intended for this mode. Yet, in the teaching of reading, modern literate societies seem to operate on the implicit assumption that reading aloud is the goal for the classroom and that silent reading will automatically follow as a skill in the wake of oral reading. That such an automatic progress does not always occur is borne out, and capitalised on, by commercially motivated courses on 'speed reading', which are based on silent reading and which lay great stress on the differences between the two reading modes. In spite of the evidence afforded by the existence and popularity of such courses, very little scholarly research has been carried out in recent decades on the comparative values, functions or underlying processes of the two modes, a surprising fact in view of the great quantity of research that continues to be carried out on other aspects of reading.

In the following sections an overview will first be given of the theories of language and reading which lie behind the ensuing comparative assessment of comprehension in silent reading and reading aloud. The basis of the assessment is an experiment carried out with controlled reading materials on a sample of twenty learners of English as a foreign language. After the setting up of hypotheses derived from the theoretical discussion, the experiment will be described in detail and its results analysed. Finally, consideration will be given to the theoretical implications of the results.

THE LINGUISTIC CONTEXT

Reading instruction during this century has been and still is based on the traditional, if unstated, view of reading aloud as the norm and as the necessary prerequisite to silent reading (which supposedly follows automatically). Implicit in the emphasis on oral reading is the idea that written symbols are simply a convenient representation of speech, an idea which is still propounded by reading teachers who employ the method called 'phonics'. This approach stresses the association of

sounds and letters and it is claimed that each letter 'says' a particular sound, a claim which is true only to the degree that phonetic and phonemic representations are similar and to the degree that the written symbols stand in a one-to-one relationship with the phonemes of the language. The claim is clearly an oversimplification in regard to English. On the other hand, the 'whole word' method, which attempts to by-pass the surface irregularities of English by teaching learners to recognise whole words, fails to make full use of those regularities which do exist. Regardless of their relative merits, both approaches focus on reading aloud and both have looked to linguistic theory for rationalisations of their procedures in terms of linguistic 'truth'. They have found that such truth has an unfortunate habit of being undermined by the rapid changes which take place in this relatively young discipline.

For example, structural linguistics supposedly provided theoretical support for phonics, in particular, and for reading aloud generally, by placing heavy emphasis on the primacy of speech. The more extreme expression of this tenet, 'language <u>is</u> speech', gives the written form no importance at all, regarding it solely as an imperfect reflection of speech. Naturally this view bolstered the approach to teaching reading which tries to connect the orthographic symbols with spoken forms through phonemic-graphemic correspondences.

Again, a methodological tenet of structural linguistics — that the sound system of a language is the necessary starting point of its grammatical description — provided apparent succour for phonics-based reading pedagogy, as it was taken to imply that meaning must at some point be filtered through sound.

Linguistic theory since the late nineteen fifties has moved radically away from the basic tenets of structuralism, while still having its origins in it. A corollary of this is that theories of reading which seek support in linguistic theory

have had to look anew at the source of their support; they have found little comfort there. Rather, as a consequence of the radical changes, the support they derived from structuralist linguistics has been eroded.

While the chronological primacy of speech in a historical and sociological sense is a fact, such primacy in the individual is not a necessary condition in the relation of spoken and written language (the deaf would not otherwise learn to write before they learn to speak). This is pointed out by Bever and Bower,[3] who argue, on the basis of the transformational model, that it is possible to go from the visual input directly into the underlying structure of the sentences, by-passing the auditory perceptual mechanism.

As to methodology, it has become increasingly observed that phonologically based grammars cannot produce satisfactory analyses of syntax. The more recent theories of grammar, therefore, and in particular the standard transformational model, take syntax as a starting point and speech or writing as end products.

It is thus no longer possible for orally-based theories of reading pedagogy to derive support from formal linguistic theory in terms of the primacy of speech or linguistic methodology. Such support is of dubious value in any case, firstly since formal linguistic theory is in a state of flux in comparison with the thirties, forties and fifties of this century and secondly because it does not take into account the vital distinction between theories of competence and of performance.

The distinction is important because it reflects the difference in approach to language study of the linguistic theoretician on the one hand and, on the other, the educationist, psychologist or language teacher. The linguist's concern is with competence — the abstract body of knowledge that makes performance possible;

performance — actual language use — is the chief concern of the more applied interests, such as theories of reading pedagogy. The crucial point is that, by confusing theories of competence and performance and drawing support from one for practical activities in the other, the reading theoretician takes a logically invalid step: there is no a priori reason why a competence model is necessarily functional in actual performance. The competence model replicates rather than simulates the language processing that occurs in the mind; for example, directionality between levels and categories in a competence model may exist purely for theoretical and formal convenience of representation, with no equivalent directionality in performance. This is not to say that a competence model should not be subsumed in a performance model, if the former could be shown to be functional in real-time language processing. Indeed some competence models may be found to be more suited to such inclusion than others. For instance, we may prefer for this purpose one or other of the two basic approaches to semantic interpretation current in transformational studies: interpretive semantics, which holds that the underlying base of language is a syntactic structure, with meanings assigned to sentences only after a syntactic structure is assigned; or generative semantics, which holds that the underlying base is a semantic structure, with syntactic rules applied to this base. The latter seems closer to psychological 'reality' in language use, since utterances are in some basic way intended to transfer meaning from the mind of one individual to the mind of another. Yet such a conclusion may be both superficial and misleading, as neither model is intended as a simulation of performance and there is no inherent directionality among the various components of a competence model (the formal organisation of the rules themselves does not necessarily determine their order of application in real-time use).

In the present state of our understanding of language and language processing, therefore, there is little, if any, justification for assuming that what is said about an

idealised speaker/hearer or writer/reader may be used as a prop for theories of reading performance.

The context of the models considered in the next section is that of language processing in its application to reading. They are all therefore performance models, which must be validated in their own terms and which cannot look to competence models for their justification, except in an indirect way.

Section II MODELS OF THE READING PROCESS

1. Thorndike
2. Bever and Bower
3. Smith
4. Goodman

The central theme of this dissertation is the relationship between sound and comprehension in the reading process and whether, or to what degree, meaning in this process is mediated through sound. A closely related matter is whether the articulation of sound in reading aloud has any effect on comprehension. Consideration is therefore given in this section to definitions and accounts of the reading process which all deal with aspects of our theme. The models proposed by Smith and Goodman are given detailed attention, as they run counter in important ways to the more generally accepted ideas of the reading process. In addition, statements made by Goodman lead into the experiment described later.

In the ensuing discussion, the notions of meaning, comprehension and text, which would elsewhere deserve detailed consideration in their own right, are given working linguistic definitions as follows: meaning — the structured, conceptual situation or picture evoked in the minds of native speakers of a particular language by a string of well-formed linguistic units in that language; comprehension — the successful transference of meaning from the mind of the speaker/writer to that of the listener/reader; text — a connected passage of discourse.

1. THORNDIKE

The most influential description this century of the reading process in relation to understanding the meaning of a text has probably been that produced in 1917 by Thorndike. His conclusion was that reading is reasoning, a conclusion reached after experimentation which involved the study of mistakes made by children in answering paragraph comprehension questions.

The following quotation will illustrate his viewpoint:

> Understanding a paragraph is like solving a problem in mathematics. It consists in selecting the right elements of the situation and putting them together in the right relations, and also with the right amount of weight or influence or force for each. The mind is assailed as it were by every word in the paragraph. It must select, repress, soften, emphasize, correlate and organize, all under the influence of the right mental state or purpose or demand.... It thus appears that reading an exploratory or argumentative paragraph ... involves the same sort of organization and analytic action of ideas as occur in thinking of supposedly higher sorts.[4]

Thorndike's approach provides the basis of the most common type of reading test, the short passage followed by direct questions or multiple-choice questions testing comprehension of the main thought and of particular details. More interestingly from the theoretical point of view, the reasoning process he describes is still accepted as the basis of the act of reading. It involves analysis and synthesis, induction and deduction.

Although Thorndike does not draw the analogy, it is commonly observed in the literature on language learning that reading is a process which is parallel to the process of listening. In this way, the similarities are emphasised between comprehension of graphological symbols and phonological within the same language system, while at the same time the concept of the primacy of speech is usually mentioned. Typical of this approach is Moyle's answer to the question 'What is reading?':

> Writing is the process of presenting speech in a more permanent visual form and therefore reading can be looked upon as the reverse of this process, namely, turning the collection of symbols seen on the paper into 'talk', or, in the case of silent reading, into an image of speech sounds. This in English means gaining the ability to read from left to right and from top to bottom of the page, the recognition of letter symbols and their grouping into words.[5]

In a similar vein, Carroll's definition stresses the close relationship between speech and reading:

> We can define reading, ultimately, as the activity of reconstructing (overtly or covertly) a reasonable spoken message from a printed text, and making responses to the reconstructed message that would parallel those that would be made to the spoken message.[6]

Again, the sequence of events from visual observation of written symbols to a message, or meaning, in the reader's mind is assumed to be through the intervening and necessary stage of spoken language. Or, differently stated, it is regarded as impossible to derive meaning in reading without first filtering the graphological symbols through the sound system of the language.

This analysis of the reading process remains the more usual one. It has been widely accepted among scholars, such as Lado[7] and Rivers,[8] in the field of English as a second or foreign language. Only recently have the beginnings of a departure from this approach emerged in ESL/EFL commentaries, as in a recent article by Rigg,[9] based closely on the work of Goodman and Smith. It is these two writers who have been the chief proponents of a view of reading unlike the more usual one. The usual view has been thoroughly castigated by Smith, strongly criticised by Goodman and modified by Bever and Bower. Underlying the castigation, criticism and modification is the view that spoken language is not, or does not have to be, an intervening stage in the reading process between written symbol and comprehension. Bever and Bower's proposals will be sketched first, followed by a detailed critique of Smith's ideas and an account of Goodman's

2. BEVER AND BOWER

In 'How to Read without Listening', Bever and Bower argue that there exist two types of reader: visual and auditory. 'The majority of readers use primarily the perceptual processes used

in auditory perception of sentences. Other readers appear to analyse the visual input directly...'.[10] In support of this claim regarding performance they cite evidence from the transformational model of language competence and thereby take the step which, pointed out in the previous section, is logically invalid. The syntactic insights of the transformational model, they state, '...clarify the nature of different kinds of reading habits.'[10] The claim here is too strong. Rather, the insights suggest ways in which the different reading strategies might be clarified in a performance model. The two extremes of perceptual strategy proceed thus: the first uses as much as possible of the perceptual routine already developed for the perception of spoken sentences, without actually reading sentences aloud; the second uses a purely visual perceptual routine independent of the acoustic routine. Readers using the second strategy are said to 'develop underlying phrase structure for auditory sentences'.[11] Thus for visual processing there remains a link with auditory structure in the Bever and Bower model, a link which is denied by Smith.

Underlying the more recent view of language processing propounded in one form or another by Bever and Bower, Smith and Goodman is the Chomskyan model, which triggered off the spate of psycholinguistic research of the last twenty years. Typically, the Bever and Bower argumentation in regard to reading reflects generative phonology. They point out that in the transformational model the hearer imposes an interpretation on the sound that he hears by means of an auditory perceptual strategy. This utilises his knowledge of the structure of his language, including the cycle of phonological rules: '...the perceptual segmentation of speech proceeds according to the surface phrase structure, and the perception of stress and pitch depend heavily on an active use of grammar'.[12] They apply a similar principle to the perception of visual symbols to arrive at their distinction between auditory and visual readers. Yet they do not try to prove that there is a one-to-one relationship

between knowledge of abstract rules and language performance. Equally, the experiments described by Greene[13] do not establish this link, since, as she puts it, 'it is easy to slip from the regularities observed in linguistic usage into the stronger claim that grammatical analysis describes the internalised knowledge upon which the speaker draws when producing and understanding sentences'.[14]

3. SMITH

Smith, too, accepts the transformational model as a basis for his performance model, exploiting especially the analysis of language into deep and surface levels. He takes an over-extreme approach to the central issue of mediation of meaning through sound (or, more abstractly, through phonology) in the process of reading. He writes: 'The belief that reading involves decoding, or transforming, or reconverting, written symbols into spoken language is as old as the alphabet. The belief underlies practically all approaches to reading instruction...' Smith calls this 'the decoding to sound hypothesis' and characterises it as 'the great fallacy'.[15] The model of reading which is proposed as an alternative is one in which spoken language and written language are given equal and functionally independent statuses within the overall communication system. Where Moyle, quoted above, says that 'writing is the process of presenting speech in a more permanent visual form', Smith states the opposite:

> Written language is not speech written down....Writing is a visual form of language..., and speech is an acoustic form of language... Both writing and speech are at the surface level of language, related by hierarchical systems of rules to underlying deep structures...writing and speech stand at an equivalent level to each other, and not in any hierarchical relationship. Only historically and in the chronological development of (most) individuals can speech be said to be prior to writing.[16]

Smith gives several reasons to support his hypothesis, the main ones being (as he himself phrases them):[17]

a. meaning is independent of sound
b. meaning facilitates reading
c. meaning is required to produce sound
d. there is no time to produce sounds without meaning
e. decoding to sound is not the natural way to read
f. subvocalisation does not aid in understanding a text.

Smith's approach to the issue of decoding to sound, or phonological mediation, has an evangelistic fervour, a factor which generally indicates that the arguments in use should be very closely scrutinised. Many of the major arguments presented by Smith do turn out to have important weaknesses and the six assertions given above will therefore be discussed in detail. (The emotive quality of his language will be ignored, though it may be pointed out that it does not help to incline the opposition to his view when he remarks that 'the decoding hypothesis bears no more relation to reality than the speculations of the early anatomists that the liver was the organ of the intellect', or that modified versions of the decoding hypothesis are a 'half-hearted compromise'.[18]) Smith's assertions deal with various topics connected with the relationship of meaning and sound, a relationship central to the hypothesis investigated in this experiment.

a. <u>Meaning is independent of sound</u>

This is the first claim made by Smith and in support of it he draws a parallel between translation across languages and 'translation' between written and spoken modes within the same language. In the same way that translation from one language to another must be mediated through meaning, so too, argues Smith, written language must be understood before an acceptable translation into spoken language can be produced. ('Acceptable', here, is defined as comprehensible to a listener). Meaning can indeed be extracted from written language without mediation through sound: it is fairly common for persons interested in the written publications of a particular foreign

language to learn to read it without reference to its phonology. However, in most cases, such readers are likely to give phonetic or phonological values to the script, if it is an alphabetic one, on the basis of their first language. They would not do so unless they felt there was some necessary connection between written symbols and sound. Smith dismisses this type of behaviour too lightly as 'classroom-induced', a criticism which might equally vaguely be levelled at other aspects of language behaviour. At the same time he does not, to put it mildly, give much credit to the classroom in its attempts to induce what he regards as good reading behaviour, reading for meaning:

> Children are insufficiently cynical about the motives and habits of adults to imagine that they would engage in, and try to teach, an activity as meaningless as the serial identification of lists of unconnected words.... The better readers are those who, despite instructional insistence to the contrary, follow their instinct that reading is a process that is supposed to make sense.

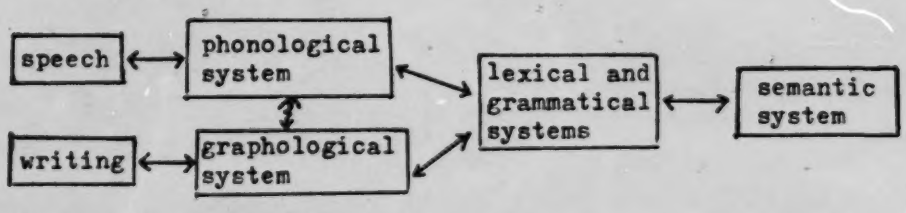
Smith here misrepresents what most reading teachers try to do: it cannot in fairness be said that the serial identification of lists of unconnected words is their true pedagogic goal.

The assertion that the relation between the written code of English and its sound system is 'quite coincidental to reading' is inaccurate for the majority of proficient readers, though it may be accurate for most 'speed reading', those who have attained exceptional speeds through special training. In the same paragraph Smith claims that the written code of English 'bears some indirect or imperfect relation to the sound system of the language'. While 'imperfect' is a good description of the relation, 'indirect' is not. The notorious difficulty of learning English spelling, in the case of native speakers as well as foreigners, is often exaggerated. There are extremely strong interrelationships between English spelling and pronunciation, which, for historical reasons, are partially obscured. A description of the interrelationships could be

given in either direction: an account of the spelling rules which state how the phonology should be represented in a graphological system and an account of the pronunciation rules which state how the written forms should be uttered. It is these strong interrelationships which permit native speakers to pronounce, with reasonable confidence, unfamiliar written forms.

The major weakness of Smith's view here is that he tries to ignore the fact that the sound system and the writing system of English are parts of a single and highly integrated system. They are indeed different parts, but the high degree of integration ensures that the parts will, at the very least, influence each other. In fact it is not simply a question of superficial influence but rather of an interlocking relationship in which one part, the writing system, is in a situation of greater dependence. This close relationship may be demonstrated by pointing out what proficient speakers and readers actually do in producing and perceiving written language: they constantly relate the two systems in an important way. Firstly, spelling errors based on pronunciation are frequent. It is therefore likely that something 'heard' in the mind is being written down. Secondly, pronunciation errors based on spelling occur. It is therefore likely that something 'seen' in the mind is being pronounced.

In order to place the spoken and written systems in their broader context, the overall set of relationships for English and other alphabetically written languages may be represented in the following schema:



The set of arrows into and out of the phonological and

graphological systems represents the following relationships: speech and writing are respectively manifestations of the phonological and graphological systems, which in turn have separate but parallel links with the lexical and grammatical systems. The phonological and graphological systems therefore have an indirect relationship at this point. In addition, however, they have a direct relationship, although they are far from being isomorphic. This direct relationship is complex and often inconsistent, which accounts for the difficulty of learning to speak and read English, in which the lack of isomorphism is particularly marked. It is difficult to quantify the isomorphism which does exist, but it is substantial. A complete description of English does not require one account of semantics, lexis or syntax for the writing system and another for the sound system; the same account will serve both. Nor is a completely separate account required for the writing and sound systems themselves.

The close connection between the writing and sound systems of English is evident in the results of research by Gibson and associates into grapheme-phoneme correspondences, which demonstrate the invariant relationship of English letter-groups with phonemic patterns: 'Pseudo-words conforming to rules of spelling to sound correlation were compared with ones of low correlation under conditions of tachistoscopic viewing.... It was found that the Subjects reproduce pseudo-words of high correlation more accurately than ones matched for summed letter frequency, but of low correlation.'[19]

Theoretical support for this position is available in an article by Chomsky, though the caveat concerning transference of argumentation from theories of competence to those of performance must be borne in mind. Chomsky's main point in the article is that the conventional orthography of English provides the information that the speaker needs in order to pronounce the language: 'the relation between conventional spelling and phonological representation is very close, and...conventional

spelling is, by and large, a highly effective system for a wide range of dialects because it corresponds to a common underlying phonological representation...'.[20] Chomsky further states that the study of sound-letter correspondences can be divided into three parts:

i. phonology (the bulk of the study)

ii. the near one-to-one relations between phonological segments and letters (or conventional letter sequences) and

iii. a residue of exceptions.

This type of distinction is not drawn by Smith, possibly because it does not help him in his attack on the conventional view of reading. Indeed, Chomsky goes on to say that, given this division of the study,

> it would seem to follow that the rules of sound-letter correspondence need hardly be taught, particularly the most general and deepest of these rules. For these rules are in any event part of the unconscious linguistic equipment of the non-literate speaker. What he must learn (except for true irregularities) is simply the elementary correspondence between the underlying phonological segments of his internalised lexicon and the orthographic symbols.[21]

This approach accords with the decoding to sound hypothesis (if sound is taken as referring to a level more abstract than the purely phonetic).

b. Meaning facilitates reading

Under this heading, Smith points out the well-established fact that the more prior understanding that can be contributed by a reader, the less information is required from the code. Meaning, in the form of semantic and syntactic constraints, minimises the amount of visual information required to identify words occurring in meaningful sequences. Unfortunately, Smith weakens his own case by carrying this point to an extreme. It is unfortunate because the fact of meaning facilitating reading, centring as it does on prediction of possible meaning, is the main support of his model of the process. The extreme referred

to is the paradoxical notion that 'the underlying meaning of a set of words can be utilised to aid in the identification of the words themselves'. The paradox is not resolved by Smith, though he claims to do so by trying to remove meaning totally from the realm of words ('...meaning is clearly (!) something extralinguistic, something beyond words')and using his new concept of it in a circular argument:

> If we require less visual information to identify a word in a meaningful or predictable sequence than to identify the same word in a random order or less predictable sequence, then our uncertainty about the identity of the word must have been reduced by some information from the sequence as a whole - by the information that I have been calling meaning.

I find it impossible to see how meaning can first be obtained from a sequence as a prerequisite to obtaining meaning from the same sequence. Related to the circularity here is the problem of where the initial information is obtained in order to start the predictive process going. Is it from the first few letters or words or both, as seems likely? Or is it from some extralinguistic source, which seems impossible (let alone 'bizarre' or 'perverse', as Smith describes it before he tries to explain away the difficulties of his position)?

c. Meaning is required to produce sound

In discussing this issue Smith writes: 'Before you can utter a sentence (in reading), you must know what it means. Only the meaning of the entire sequence will tell you the syntactic role of the individual words, which for some words is essential for any decision about intonation'. This is true, only where good reading aloud is concerned. It is, however, possible and does happen that intelligible reading aloud is produced by a reader who does not understand the meaning of what he is reading. The particular context in which this occurs is usually a liturgical one, in which the reader has been specially trained in this type of reading. This is admittedly an exceptional

context, but serves as a pointer towards a more common one. It is definitely possible to read aloud without understanding and yet to be understood by a listener. This was recognised by West in his strictures upon the value of certain kinds of reading aloud in the classroom:

> ordinary Reading Aloud is not merely a useless exercise for foreign language learners: it is likely to be actually harmful, because it tends to produce just that evil which the teacher is most anxious to prevent — parrot talking without thought of any meaning. Reading aloud tends to establish a direct path between the eyes and the voice without disturbing the brain at all.[23]

It is therefore clear that Smith's claim is too sweeping.

d. <u>There is no time to produce sounds without meaning</u>

Under this heading Smith points out that visual processing of written information can take place at only specific and limited rates for both letter (research by Kolers, 1970)[23] and word (research by Smith and Holmes, 1971)[23] processing. He also mentions the 'eye-voice span' in reading aloud as indicating the distance ahead that the reader is sampling before committing himself to the actual utterance of a word. These points are regarded as evidence that there is no time to produce sounds without meaning: 'We need information over an average span of about four or five words in front (and also four or five words behind) if we are to read a word aloud comprehensibly and with comprehension'. The necessary link between this conclusion and the facts given in support of it is not easy to see, unless we assume that mediation through sound must take place at the same rate as normal articulation. Such an assumption is convenient in accounting for the greater speed and efficiency of silent reading, but it is unwarranted in terms of the mediation through sound hypothesis. As suggested in the discussion of Goodman's model, mediation through sound may take place at a speed which, in comparison with the rate of normal articulation, is almost instantaneous (through some neural device akin to Morton's 'logogen', but serving a different purpose).

e. Decoding to sound is not the natural way to read

Smith does not offer any definition of what he means here by 'natural'; he seems to assume that his own model is according to nature whilst any other is by implication 'unnatural'. The other models are probably meant to be regarded as 'artificial', 'forced' or simply 'wrong'. He refers a number of times to what children and fluent readers do 'instinctively': '...reading for meaning, not reading to identify individual words'. A result of this is that their errors are often deviations from the actual written cues, but remain meaningful and consistent with the intended message. This means that they are not reading word for word, which in turn means, according to Smith, that they are 'obviously not reading by decoding to sound'. He continues: 'The decoding point of view requires a word by word model of reading, and any evidence that readers do not read word for word is evidence against the decoding hypothesis'. It is not in fact the case, however, that the decoding point of view requires such a model. Just as there is a stream of speech with large stretches unbroken by gaps (except in the mind of the listener as his knowledge of the language imposes patterns on what he hears), so too the sounds to which decoding takes place in the reader's mind may be in the form of an unbroken stream over large stretches (with the same imposition of patterning in the reader's mind). Even in speed reading the decoding to sound hypothesis has as much validity as the direct decoding hypothesis. By using a small proportion of all the information contained in all the words (rather than all the information of only every fourth or tenth word) the speed reader still has available all the phonological information of the words and decodes to sound in the same way as the normally proficient reader.

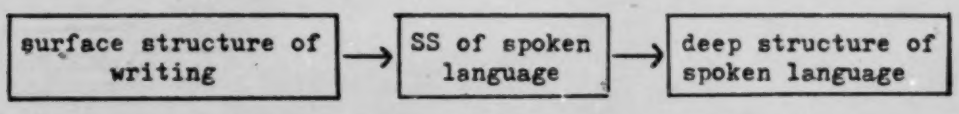
In this section, Smith implies strongly that children are not taught to read for meaning, but rather for words, and that only their own instinct, frequently in spite of instruction, tells them that reading is meant to provide meaning. In fact it is

blatantly obvious to all children who have observed someone reading (and most have observed reading aloud either at home or at school) that meaning is being extracted from the writing. To explain that reading is meant to yield meaning would be analogous to, and as self-evident as, explaining that speech is meant to be meaningful.

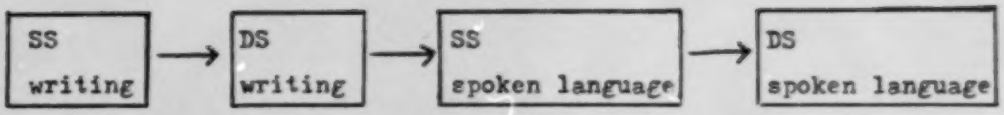
f. Subvocalization

It is frequently observed that proficient readers and beginners subvocalize, the former when confronted with difficult words, the latter at all times. Upholders of the decoding to sound hypothesis regard this as evidence that their view is correct. Smith sees subvocalization by proficient readers as regression to classroom-induced behaviour, a blanket criticism which could be applied to any evidence that runs uncomfortably counter to his own view. He argues that 'if a reader can extract sufficient meaning from text to read aloud (or subvocalize) in an intelligible way, then he has extracted sufficient meaning to dispense with vocalization or subvocalization altogether'. This argument assumes (without proof) that subvocalization cannot provide a route to comprehension. As stated in an earlier section, meaning does not necessarily precede sound. Indeed sound, whether vocalized or represented in the mind, may facilitate comprehension.

In conclusion, Smith writes that given a model of language which has two 'levels' — a deep structure and a surface structure — the decoding to sound hypothesis would give the following sequence:

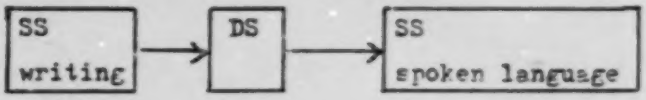


However, according to Smith, it is not possible to move from the surface structure of written language to the surface structure of speech without passing first through the deep structure of writing. So he interposes a second stage to give:

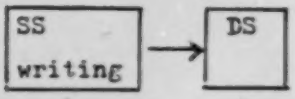


Since the two deep structures in this sequence are the same, he eliminates one. Consequently, the following models are given for reading aloud and for silent reading:

READING ALOUD:



SILENT READING:



Smith comments on these as follows: 'In such a conceptualisation, there is no room to hypothesise decoding to sound at all'.

However, this conceptualisation is not necessarily a true reflection of the reading process. Indeed, the weaknesses noted in Smith's supporting arguments (a. to f. above) lead to the conclusion that his basic thesis is unsound. Equally, the arguments in favour of decoding to sound, especially in alphabetic writing systems, remain relatively strong. Finally, if we accept the processing sequence offered by Smith for reading aloud and silent reading, we may safely hypothesise that the two reading modes would yield equal amounts of meaning for equivalent texts, since articulation in reading aloud is added after the extraction of meaning. This hypothesis was tested and found wanting in the experiment described in Section III.

4. GOODMAN

Goodman's model of the reading process is similar to Smith's in many respects, though Goodman is less extreme in stating the degree to which proficient reading is independent of phonological mediation. In addition, a qualitative difference between their models is reflected in the following statement:

> The starting point is graphic in reading and we may call one cue system graphophonic. The reader responds to graphic sequences and may utilise the correspondences between the graphic and phonological systems of his English dialect. I should point out that these are not phoneme-grapheme correspondences but in fact operate on morphophonemic levels (that is, spelling patterns relate to sound sequences).[24]

Elsewhere, referring to this graphophonic cue system as a basic kind of information required in reading, he remarks: 'This is the information from the graphic system and the phonological system of oral language. Additional information comes to the reader from the interrelationships between the two systems. Phonics is the name for those relationships'.[25] It is clear from these comments that Goodman does give an important place to the phonology, even in silent reading, though he does so in a usefully selective manner. He distinguishes three stages in the development of reading proficiency:

i. oral, in which reading aloud is the normal mode,
ii. aural, in which the reader 'listens in' to the text and
iii. silent, in which sound normally plays no part. (While the stages are suggested by Goodman, the designations are by Pugh.)[26]

Since there is so much individual variation between readers, it is no doubt true that the reader 'may utilise' the correspondences between the graphic and phonological sequences and that these interrelationships provide him with 'additional information'. (Individual differences are revealed too in the results of the experiment described in Section III.)

In respect of syntactic and semantic cue systems, Smith and Goodman are very much in agreement. Syntactic cues permit the reader to recognise and predict meaning. And at the same time all three types of cues interact and inform each other. The emphasis is on prediction, followed by testing of the prediction against information already held in the memory and against the constantly inflowing new information.

In a key article, Goodman explicates his view of the reading

process, calling it a 'psycholinguistic guessing game' to differentiate it from the 'misconception' that 'reading is a precise process' that 'involves exact, detailed, sequential perception and identification of letters, words, spelling patterns and larger language units'. More fully, this guessing game is a 'selective process' which 'involves partial use of available minimal language cues selected from perceptual input on the basis of the reader's expectation. As this partial information is processed, tentative decisions are made, to be confirmed, rejected or refined as reading progresses.'[27] It follows from this conception of reading that the more skilled reader is not the one who has the more precise perception and identification of all elements, but, rather, the one who uses the least number of cues necessary for correct 'guesses' (or predictions) at the first attempt.

Goodman does not help to persuade the reader of the validity of his argument by using the word 'guess', which is usually defined as 'estimate without calculation'. An 'informed guess' would be a more appropriate description, as 'calculation' is definitely involved. In fact, the process he describes could also, and more conventionally, be termed inductive reasoning. On the basis of a sufficient number of particular instances (the smallest necessary number of visual and/or syntactic and/or semantic cues) a generalisation (tentative ascription of meaning, subject to confirmation on further reading) is made. The 'inductive leap' in the process is the 'guess' in Goodman's terminology.

Goodman further implies that there are deductive processes at work. The particular decisions, selections and activities of any one act of reading are all embedded in the sum total of the reader's development in language and thought. 'This self-evident fact needs to be stated because what appears to be intuitive in any guessing is actually the result of knowledge so well learned that the process of its application requires little conscious effort.' In effect, this is deduction from well learned

generalisations about the world and about language to particular facts in a specific reading context.

In relation to silent reading and reading aloud, Goodman specifies a process which he calls recoding (to distinguish it from decoding). This is simply a matter of putting the same information into a different set of surface symbols: graphological symbols into phonological, according to the phonological mediation hypothesis. Decoding occurs only when the reader or listener analyses the surface structure to obtain semantic information. Granted this distinction, there are three ways in which these two operations can be arranged in reading aloud:[28]

i. Graphic input is recoded as oral language and then decoded (i.e. 'decoding to sound').
ii. Graphic input is recoded and decoded simultaneously.
iii. Graphic input may be decoded first and the resultant meaning is then encoded as oral output.

The first of these is dismissed by Goodman as the common misconception. The second does not accord with the existence of 'eye-voice-span' (i.e. reading ahead during articulation). The third is accepted by Goodman as a true picture of reading aloud. This permits silent reading to be a more rapid and efficient process than reading aloud for two reasons:

i. Attention is not divided between decoding and recoding or encoding, as it is in reading aloud.
ii. Speed is not restricted to the speed of speech production.

Goodman remarks that reading silently is not only more efficient than reading aloud, but that it is also more efficient than listening, which, like reading aloud, is restricted to the speed of the speaker. The weakness of this argument is that it does not consider the possibility that recoding may take place at a very great speed in silent reading. It does not seem unreasonable to think that the human mind, when not constrained by the need for physiological activity in utterance, may be capable of

processing graphic input through a phonological stage to meaning almost instantaneously. The obvious fact that there is no time to store sound sequences as if at the normal rate of utterance may be accounted for if, for instance, Morton's concept of a logogen, or some similar idea of a neural unit, is posited as a necessary part of any language recognition model. The logogens are representations of words in the memory, parts of the nervous system, where a specific event takes place every time a word becomes available as a response. According to Massaro's account (Massaro (1975), p. 169), the logogen becomes activated regardless of the circumstances leading to word availability (i.e. the cues may be visual, aural or anything else). Similarly, we might suggest a neural unit which represents surface structure phonological units and which is always passed through as a necessary stage in reading. This would not automatically imply agreement with decoding to sound, but does imply some use of the phonological system in proficient silent reading.

The question naturally arises whether we may check on the validity of any aspects of Goodman's claims. Two things mentioned above immediately come to mind, the greater rapidity of silent reading, as compared with reading aloud, and its apparently greater efficiency in terms of comprehension.

Speed

A literate native speaker of any language, beyond the level of proficiency at which sub-vocalization takes place, will almost invariably read more quickly in silent reading. This is something which can easily be confirmed by simple experimentation, if not already patently obvious through superficial introspection. However, it is not so obvious that the same will be the case for a foreign learner of a language, who, even when proficient, may be nearer than a native speaker to the level at which there is sub-vocalization, or at least more reliant on phonology.

Efficiency

More interestingly, most native speakers would claim to be able to understand more when reading silently. Goodman ascribes this to the fact that attention is not divided between comprehension and production. This is less easy to check as there are many more variables than in the simple question of speed, and the native speaker may confuse quantity with quality. That is, although more ground is covered in silent reading, it is not necessarily the case that in covering an equal quantity of ground (albeit more quickly) there will be better understanding.

Accordingly, the following experiment sets out to confirm the claim regarding speed and to assess the claim regarding efficiency (taking the latter to mean better comprehension). We may state the hypotheses to be tested as follows:

I. IN READING ALOUD THERE IS A SEMANTIC DEFICIT, AS COMPARED WITH SILENT READING.

II. THIS DEFICIT IS DUE TO DIVIDED ATTENTION, BECAUSE OF THE ADDED TASK OF ARTICULATION.

Informally and briefly described, the experiment was designed to isolate the act of reading aloud as the additional element in a context which was otherwise unchanged. The effect on comprehension would then be measurable. Foreign language learners of English were selected as Subjects in order to heighten the effect of the articulation problem.

Section III THE EXPERIMENT

1. Design
2. Subjects
3. Materials
4. Procedure

1. DESIGN

A single subject, repeated measures design was used. The two conditions of the experiment were reading aloud and silent reading. The independent variables were a set of four reading passages, each followed by five multiple-choice comprehension questions. The dependent variables were the comprehension scores obtained by each Subject . Each Subject was tested twice under each condition. Counterbalancing, to neutralize any possible order effect, was provided for by assigning the Subjects to one or other of two groups (X or Y), in which the passages for reading were reversed in relation to the two experimental conditions. Randomisation in assigning Subjects to a particular group was achieved by placing them in the groups before meeting them. The variables which were controlled were length of reading passage, difficulty of reading passage (in terms of lexis and grammatical structure), level of Subjects' attainment in English language and first language of Subjects.

Two additional tests were provided: a pre-test of certain lexical items from the reading passages, as a check on whether certain items were unknown to the Subjects; and a short cloze test, to provide an independent measure of the English proficiency of the Subjects. There was also an extra reading passage, slightly different in character from the others, tested in only one of the conditions.

2. SUBJECTS

Various language schools in Cambridge provided the Subjects, who were all native speakers of French. Twenty Subjects were used. All were at, or slightly below, the level of skill required for the Cambridge Proficiency Examination. (This was confirmed by the results of the cloze test.) The selection of

the particular sample was made by the administrators of the language schools concerned. The sample may be regarded as representative of most native speakers of French at a similar level of proficiency in English, although some bias may exist through a degree of self-selection (the subjects were all volunteers and had all been motivated enough, for whatever reason, to study in England). They varied in age from eighteen to thirty-five (approximately).

3. MATERIALS

The test materials were a pre-test, a cloze test and five reading passages with comprehension questions. (A full set is provided in Appendix A. The answers are given in Appendix B.)

a. Pre-test

This consisted of 57 questions and was designed as a means of keeping track of the Subjects' understanding of the lexical items used in the passage, but not occurring in West's A General Service List of English Words.[29] West's list contains 2,000 words, the commonest in a count based on five million. The level of attainment in vocabulary of the Subjects would normally be above that of the list, but because of individual variation it was thought prudent to check on words outside the 2,000. This accounts for the odd number of questions in the test and the unequal distribution among the passages. The test is in no way intended to reflect individual proficiency and many of the items are therefore very easy, although plausible distractors were naturally selected. For each item, a single sentence context in English was supplied and the item underlined. Four alternatives in the mother tongue were then given, only one of which was reasonably close to the key word or phrase in the sentence. French words similar in form to the English key word were avoided, to ensure that the correct answers could not be given only on the basis of intelligent guesswork. The distribution among the five passages was as follows: A 1-10, B 11-16, C 17-24, D 25-50, E 51-57. The Subjects were deliberately made aware by the test administrator

that the pre-test items would be coming up in the reading passages, thereby reducing the effect on comprehension of not knowing words outside West's list. In a sense Subjects learned such words by doing the pre-test.

b. Cloze test

This was included to provide an independent measure of the English proficiency of the Subjects. The passage used for the test was the last paragraph of an extract from The Concise Cambridge History of English Literature.[30] (The preceding paragraph, slightly adapted, was used as reading passage A). Every fifth word was erased; there were 30 blanks and the passage was accordingly marked out of 60 in the usual way for cloze tests: for each blank, one mark was given for semantic and another for grammatical adequacy.

c. Reading Passages

Passages A and B were an equalised pair, as were C and E. Originally, C and D formed a pair, but after a pilot test with two Subjects, D was isolated as being different from the others in having an exceptionally large percentage of words not in the West corpus of 2,000. Passage E was then produced as a much closer parallel to C. D was retained and used in the experiment to provide an interesting sidelight on other passages, since it now contained a distinctive quality.

The starting point in producing the reading passages was an extract from The Concise Cambridge History of English Literature contained in a standard textbook geared to the Cambridge Certificate of Proficiency in English. The passage is graded 'C' by the author, on a three-point scale, in which this signifies a level 'suitable for classes above Lower Certificate Level who are seriously beginning preparation for the Certificate of Proficiency'. The second paragraph of this extract was slightly simplified and abbreviated, and used as passage A. Passage B was then written by the experimenter on a different topic but parallel in overall structure, length

and difficulty to A. Passages C, D and E were written by the experimenter, C and E forming the experimental pair, for the reason stated in the preceding paragraph. A number of pronunciation difficulties, based on L1 interference problems of French learners of English, were deliberately introduced into C, D and E (noted below). Again, the pair of passages was equalised as far as possible.

Characterisation of the reading passages

A Number of words - 130
Number of words not in West's list - 10 (=7.7%)
Number of cognates or near-cognates (English-French) - 23 (= 17.7%)

B Number of words - 130
Number of words not in West's list - 6 (= 4.6%)
Number of cognates or near-cognates - 25 (= 19.2%)

C Number of words - 225
Number of words not in West's list - 8 (= 3.6%)
Number of cognates or near-cognates - 37 (= 16.4%)

E Number of words - 225
Number of words not in West's list - 7 (= 3.1%)
Number of cognates or near-cognates - 35 (= 15.5%)

D Number of words - 225
Number of words not in West's list - 26 (= 11.6%)
Number of cognates or near cognates - 48 (21.3%)

Pronunciation difficulties

Amongst the usual pronunciation problems of French native speakers learning English, the following words (some deliberately introduced) were expected to cause particular difficulty:

A brother, rather, theory, genius, organiser,

inspiration, influence, circulating, government, Quaker, blasphemers.

B Andrew, Brotherhood, Burns, association, firmly, outstanding, capable, bagpipes.

C Hamish, laboratory, mixture, chemicals, damage, especially, south, side, consequence, sensational, insensitivity, information, redoubled, sympathy, accident, pension, grave, scientific.

D Henry, stethoscope, surgery, proportions, type, accident, agitation, abrupt, investigation, arrangements, media, seize, sensationalism, evidence, authorities, vague, absurd, ardent, inauguration, imperturbable, direction.

E Rory, Thwaites, months, therefore, examination, consequences, anxiety, bicycle, effort, sympathetic, frequently, double, threat, social, status.

The difficulties expected in the passage arise from the influence of the first language, French, interference from which may be be summarised as follows (adapted from O'Connor (1967), pp. 171-2):

i. Rhythm

French is syllable-timed and English stress-timed, with the consequent carry-over into English of the French characteristic.

ii. Intonation

There are major differences in this respect between the languages and again the French patterns are carried over.

iii. Consonants

/ θ / and / ð / do not occur in French and are replaced by /s/ and /z/ or by /f/ and /v/. /h/ does not occur in French and is

normally omitted in English. /p,t,k/ are generally not aspirated in French, sometimes causing confusion with English /b,d,g/. /t/ and /d/ are dental stops in French. /ŋ/does not occur in French and is sometimes replaced by French /ʃ/. /l/ is always clear in French. /r/ in French is usually a voiced, uvular fricative and is used instead of the English palatal. English consonant clusters do not cause much difficulty, except where /θ/, /ð/ and /h/ are concerned.

iv. Vowels

/i:/ is generally used for both /i/ and /i:/. /ʌ/ is generally used for both /æ/ and /ʌ/. English /ɔ/ is often pronounced like /ʌ/. English /ɔ:/ is often replaced by French /o/, and by /o/ + uvular /r/ when followed by palatal /r/. English /ou/ is also often replaced by /o/, thus being confused with /ɔ:/. /u:/ is used for both /u:/ and /u/. /ə:/ is replaced by /œ/ + uvular /r/. /ei/ is replaced by /e/. English diphthongs /iə/, /ɛɔ/, /uə/ are replaced respectively by /i/, /ɛ/, /u/ + uvular /r/. /ə/ is replaced by a variety of French sounds, because it is spelt in several ways in English. French vowels are usually short and this leads to a shortening of the English long vowels.

d. Comprehension Questions

For each reading passage there were five comprehension questions of the multiple choice type. Students were asked to select the 'best' answer (closest in meaning to the idea in the passage) and not the 'right' one, as in some cases two options were possible. In these few cases, however, one was distinctly superior. (For example: A 3. (a) and (b) are both possible, but (a) is much closer to the meaning of the text.)

Each question was designed to test understanding of a section of the passage. As far as possible, questions based on small points of grammar or vocabulary were avoided, since the intention was to test comprehension more generally. Just as the passages were parallel in structure and difficulty, so the

comprehension questions were equalised.

4. PROCEDURE

The purpose of the experiment was briefly explained to each Subject in simple terms. It was emphasised that individual results would not be communicated to the school, as it was not a personal examination. Each Subject was tested individually. The time taken to complete the full testing procedure was approximately one hour for each Subject. At the start, it was made clear that, although some sections of the experiment would be timed, the Subjects should not regard any part as a race against the clock, but should simply work as steadily and rapidly as they comfortably could.

Order and manner of presentation of test sections

The pre-test of vocabulary was administered first. It was explained that it was not a test of language proficiency, but was simply to be used for reference purposes in analysing the reading data to discover whether any words caused particular difficulty.

In the reading and comprehension sections, Subjects in Group X read A and C aloud and B, D and E silently. Those in Group Y read B and E aloud and A, C and D silently. At the end of this sequence, for possible use in analysing the data, each Subject was tape recorded reading aloud the three passages which had been read silently.

At the end of each reading and before its comprehension questions, each Subject was given a simple task, unrelated to the reading and lasting at least fifteen seconds. (They were asked to write a sentence about themselves, their home town, their language school or some similar topic.) This was intended to overcome the effect of short-term memory, especially in regard to remembering the end of each passage, as the comprehension questions were attempted immediately after each reading.

At each silent reading, the Subject was asked to move a card down the page to cover the line that had just been read. This was done in order to restrict regression, thereby making the silent reading more similar to the reading aloud, in which major regression was impossible due to the constraint of having a listener. Although it is true that the use of a card makes the process less like natural silent reading, any bias in terms of the experiment would be in the direction of reducing comprehension. Should the predicted effect still occur, therefore, support for the initial hypothesis (more understanding in silent reading) would be strengthened. Before the first silent reading, each Subject was given a few minutes practice in reading a text in this manner.

As an example, the stages of a complete test procedure for one Subject are described in Appendix D.

Section IV RESULTS

The following quotation is given as an introduction to the statement of results, since it aptly captures the spirit of this type of experimentation and puts a useful perspective on the kind of result yielded:

> It is impossible not to come to the conclusion that certainty can never be reached by any design of proof.... However, uncertainty can be diminished, and the probable accuracy of observation increased....By whatever design the hypothesis is tested the results are never certain but are approximations stated in terms of probability.[31]

The results of the experiment are presented in Table I and Table II.

Table I: Scores

Underlined column headings and averages refer to reading aloud.

Subject number	Pre-test scores	Comprehension Scores A	B	C	D	E	Compre-hension total	Cloze test scores	Group A rank (Cloze)	Overall rank (Cloze)
	(-/57)			(-/5)			(-/25)	(-/60)		
X 1	43	1	3	1	0	1	6	35	9	17
X 2	52	2	3	5	4	4	18	40	6	10
X 3	52	1	4	4	4	3	16	47	3	4
X 4	45	3	5	5	5	5	23	48	1	2
X 5	52	0	4	5	4	3	16	43	5	8
X 6	51	1	5	3	3	3	15	48	1	2
X 7	51	4	3	4	3	5	19	46	4	6
X 8	53	2	3	2	2	3	12	21	10	20
X 9	45	4	3	4	0	4	15	38	7	12
X10	53	0	4	4	2	4	14	37	8	14
Averages (Group X)	49.7	1.8	3.7	3.7	2.7	3.5	15.4	40.3		

Table I: Scores (continued)

Subject number	Pre-test scores	Comprehension Scores A	B	C	D	E	Compre-hension total	Cloze test scores	Group A rank (Cloze)	Overall rank (Cloze)
	(-/57)			(-/5)			(-/25)	(-/60)		
Y 1	49	4	4	4	3	2	17	43	4	8
Y 2	43	3	2	4	3	1	13	37	7	14
Y 3	49	5	4	2	3	3	17	36	8	16
Y 4	50	2	3	2	3	2	12	34	9	18
Y 5	51	2	3	2	0	3	10	40	5	10
Y 6	49	3	2	2	1	2	10	38	6	12
Y 7	52	4	4	4	4	4	20	54	1	1
Y 8	54	3	3	5	3	2	16	45	3	7
Y 9	50	1	2	4	2	2	11	32	10	19
Y10	52	2	2	1	2	2	9	47	2	4
Averages (Group Y)	49.9	2.9	2.9	3.0	2.4	2.3	13.5	40.6		

Combined Averages

Pre-test scores	Comprehension Scores A/B	C/E	D	Total Comprehension scores	Cloze test scores
	Aloud 2.35	Aloud 3.0	Aloud none		
49.8	Silent 3.3	Silent 3.25	Silent 2.55	14.45	40.45

Combined comprehension averages for reading aloud and silent reading (out of 5)

(40 test units; 2 per Subject)

READING ALOUD: 2.675

SILENT READING: 3.275

Table II: Times

Underlined column headings and times refer to reading aloud. Bracketed times signify passages which were read aloud after the main sequence of readings (see description of test procedure on page 33).

Subject number	Reading Passages A	B	C	D	E
X 1	0.54	0.25 (0.57)	1.24	0.49 (1.24)	0.44 (1.19)
X 2	1.08	0.46 (1.07)	1.51	1.06 (1.56)	1.03 (1.38)
X 3	1.22	1.25 (1.26)	2.07	1.47 (2.15)	1.47 (1.59)
X 4	0.57	0.57 (0.59)	1.27	0.43 (1.34)	0.43 (1.21)
X 5	1.08	0.57 (1.21)	1.43	0.55 (1.48)	0.43 (1.34)
X 6	1.10	0.50 (1.10)	1.48	1.03 (1.50)	0.56 (1.40)
X 7	1.05	1.01 (1.08)	1.45	1.16 (1.44)	1.09 (1.40)
X 8	1.05	0.58 (1.07)	1.44	1.02 (1.43)	1.02 (1.41)
X 9	1.17	1.14 (1.13)	1.47	2.07 (1.54)	1.57 (1.37)
X10	0.57	1.11 (0.57)	1.27	1.18 (1.29)	1.09 (1.18)
Average:	1.07	0.58 (1.08)	1.43	1.13 (1.46)	1.07 (1.51)

	A	B	C	D	E
Y 1	0.50 (1.06)	1.03	1.21 (1.36)	1.21 (1.39)	1.33
Y 2	0.53 (1.03)	1.00	1.18 (1.40)	1.24 (1.40)	1.28
Y 3	0.33 (0.56)	1.04	1.58 (1.41)	1.44 (1.36)	1.32
Y 4	0.53 (1.12)	1.14	1.32 (1.50)	1.27 (1.48)	1.49
Y 5	1.10 (1.13)	1.11	1.22 (1.37)	1.31 (1.41)	1.36
Y 6	1.09 (1.12)	1.19	1.58 (1.50)	1.38 (2.00)	1.49
Y 7	1.15 (1.07)	1.08	1.41 (1.46)	1.23 (1.49)	1.43
Y 8	0.54 (1.02)	1.11	0.48 (1.27)	0.58 (1.38)	1.41
Y 9	1.44 (1.11)	1.22	2.03 (1.46)	2.23 (1.59)	1.55
Y10	0.51 (1.11)	1.21	1.09 (1.44)	1.13 (1.54)	1.52
Average:	1.01 (1.07)	1.12	1.31 (1.42)	1.30 (1.46)	1.42

Table II: Times (continued)
Overall Averages (X + Y)

	A	B	C	D	F
ALOUD:	1.07	1.10	1.42	1.46	1.38
SILENT:	1.01	0.58	1.31	1.22	1.07

Section V DISCUSSION OF RESULTS

SPEED

The results confirm the fact that silent reading is more rapid than reading aloud, even in the case of foreign learners of English. The difference in speed of reading might have been slightly less had complete freedom been allowed with regression in the silent reading. In such short passages, however, this would have been negligible and the differences between the average times for reading aloud and silent reading would remain substantial:

Reading times: overall averages (mins, secs)

Passage	-	A	B	C	D	E
Aloud	-	1.07	1.10	1.42	1.46	1.38
Silent	-	1.01	0.58	1.31	1.22	1.07
Difference	-	0.06	0.12	0.11	0.24	0.31

EFFICIENCY

Hypothesis I

(Silent reading is a more efficient means to comprehension).

In terms of average scores, it is clear from the results that there is a semantic deficit in reading aloud, as compared with silent reading: the average score out of five in the forty test 'units' was 2.675 for reading aloud and 3.275 for silent reading. (Each test 'unit' is a pair of readings, one aloud and one silent; each Subject read two units). Since regression was restricted in the silent reading, a factor which presumably decreased comprehension, the higher average in this mode assumes greater significance.

Hypothesis II

(Divided attention, due to the added task of articulation, causes reading aloud to be less efficient).

The design of the experiment was such that in the reading aloud condition, articulation was the only factor different from the silent reading condition. Since the dependent variable, the comprehension score, is significantly lower in reading aloud,

it may be assumed as a strong possibility that the articulation factor has a causal relationship with the semantic deficit.

Stated in the above simple and summarised form, the conclusions to be drawn from the experiment are quite clear: both hypotheses are borne out. A closer analysis, however, reveals problems which must be dealt with in terms of either experimental design and procedure or modification of the hypotheses. The use of plain averages and an assessment of them in overall terms tends to suppress a number of significant patterns in the data. For this reason, the results were considered in a number of different ways: firstly by Groups (X and Y) and test units (A/B and C/E) and then by Subject performance. A number of different techniques of statistical analysis (summarised in Appendix C) were also applied.

Analysis of Results According to Groups and Test Units

On the basis of the initial hypotheses, it can be predicted that a certain effect will occur in the pairs of readings. In the following analysis, 'the effect' occurs positively when comprehension in reading aloud is less than in silent reading. Results for the forty test units (two units per Subject) may therefore be tabulated as follows, +, -, and ∅ symbolising respectively positive effect, negative effect, and no effect:

Table III

Group		Reading Passages		
		A/B + C/E	A/B	C/E
X + Y:	+	17	11	6
	-	11	5	6
	∅	12	4	8
No. of test units		40	20	20
X:	+	10	8	2
	-	5	2	3
	∅	5	0	5
No. of test units		20	10	10
Y:	+	7	3	4
	-	6	3	3
	∅	7	4	3
No. of test units		20	10	10

Here, the important groupings are: X: A/B, X: C/E, Y: A/B and Y: C/E, since it is these which, in different combinations, provide the others. X: A/B shows a very strong positive effect; Y: C/E shows a slight positive effect; Y: A/B shows no effect; and X: C/E shows a slight negative effect. Overall, there is a positive effect, which supports the original hypothesis, but there are two other facts of striking interest in the table:

i. There is a surprisingly high number of negative and no effects.

ii. In regard to distribution, the C/E units show no overall effect, in contrast with the A/B units, and there are more positive effects in Group X than in Group Y.

These points indicate a partial inadequacy of either experiment design or test materials or hypotheses and are discussed later.

As a further check on the significance of the results in Table III, the Sign Test and the Wilcoxon Matched-pairs Signed-ranks Test were applied. The conventional 0.05% significance level was used throughout.

The Sign Test was applied first and gave the following results for the above groups of test units:

Table IV

X+Y:	A/B + C/E	- p = 0.1736	(binomial approximation for large samples)
	A/B	- p = 0.105	
	C/E	- p = 0.5	
X:	A/B + C/E	- p = 0.151	
	A/B	- p = 0.055	
	C/E	- p = 0.5	
Y:	A/B + C/E	- p = 0.5	
	A/B	- p = 0.5	
	C/E	- p = 0.5	

According to the Sign Test, therefore, only one (X: A/B) of the above probabilities is near to being statistically significant. Yet a fully valid hypothesis implies a positive effect in all cases. This then reduces the strength of support

given to our original hypothesis by a consideration of simple averages. The distribution of significances is similar to that in Table III.

An application of the more sensitive Wilcoxon Matched-pairs Signed-ranks Test gave the following results for the same group of test units:

Table V

X+Y:	A/B + C/E	- p = 0.1736	(binomial approximation for large samples)
	A/B	- p = 0.1056	
	C/E	- p = 0.235	
X:	A/B + C/E	- p = 0.036	significant
	A/B	- p = 0.01	significant
	C/E	- p = 0.312	
Y:	A/B + C/E	- p = 0.153	
	A/B	- p = 0.5	
	C/E	- p = 0.109	

These probability values indicate in a marked fashion that the Sign Test misses certain significances, which are captured by the Wilcoxon Test. Two of the probabilities (X: A/B + C/E and X: A/B) are statistically significant. Furthermore, this test shows probability values distinctly nearer significance in most of those cases in which the Sign Test gave only p = 0.5. This tends to give more support to the conclusions drawn about the original hypothesis on the basis of simple averages. The Wilcoxon Test results, emerging as they do from a more sensitive analysis, must be given precedence over the Sign Test results. The distribution of significances is again similar to that in Table III.

Analysis of Results by Subject

The initial hypothesis, if true, permits us to predict that the effect will occur in the combined scores of each Subject. So in each group, the scores for reading aloud and the scores

for silent reading were added together. They are given in the following table:

Table VI: Combined Scores (A+C and B+E, -/10)

X:	Aloud	Silent	Y:	Aloud	Silent
	2	4		6	8
	7	7		3	7
	6	7		7	7
	8	10		5	4
	5	7		6	4
	4	8		4	5
	8	8		8	8
	4	6		5	8
	8	7		4	5
	4	8		4	3
(ave)	5.6	7.2		5.2	5.9

The averages here show definite support for the hypothesis that there is a semantic deficit in reading aloud (or, stated in the opposite direction, that there is a semantic gain in silent reading). Again, this is more marked in Group X, a point which will be discussed later.

In terms of positive, negative and no effect, the following results are obtained for combined scores (A+C and B+E):

Table VII

X + Y:		X:		Y:	
	+ 12		+ 7		+ 5
	- 4		- 1		- 3
	∅ 4		∅ 2		∅ 2
No. of test units	20		10		10

The original hypothesis is clearly supported by these results, since X shows a very strong positive effect and Y shows a positive effect. Like the results obtained from keeping each Subject's two test units separate (thereby obtaining 40 test units, Table III), the overall results here also show a

positive effect, though a much stronger one. Again, the number and distribution of negative and no effects are interesting, but less obviously than in Table III. To obtain further, possibly useful information, the Sign Test and Wilcoxon Test were again applied.

Table VIII: Sign Test

X + Y:	- p = 0.038	(significant)
X:	- p = 0.035	(significant)
Y:	- p = 0.363	

The hypothesis is strongly supported by these results, in which there are two statistically significant values of p. The distribution of significances reflects those of Table VI.

Table IX: Wilcoxon Test

X + Y:	- p = 0.0401	(significant)
X:	- p = 0.004	(significant)
Y:	- p = 0.156	

Again, the hypothesis is strongly supported by the two significant p values. The p value for Y, too, in comparison with that yielded by the Sign Test, again moves distinctly nearer significance in the more refined test.

The preceding discussion of results establishes a number of facts. There is strong support for the claims made by Goodman regarding speed and efficiency in silent reading and there is also support for his attribution of greater efficiency in silent reading to the absence in that mode of the articulation factor. Also, certain interesting patterns of number and distribution emerged in regard to the predicted experimental effect, which was based on hypotheses deriving from Goodman's claims. These patterns are discussed in the next section.

Section VI DISCUSSION OF UNEXPECTED RESULTS AND OTHER ISSUES

1. The Large Number of Negative Effects
2. Distribution of Effects
3. Reading Passage D.

1. THE LARGE NUMBER OF NEGATIVE EFFECTS

This may be explained (in the same way as the positive results) in terms of

a. experiment design,
b. test materials or
c. behaviour of Subjects.

a. With regard to experiment design, the important variables were controlled and the results give no clues as to possible latent factors which might have influenced the outcome. Retention of reading passage D does not seem to have created any imbalance through a 'learning effect'; if it had, there would have been fewer negative effects, as the difference between the marks for reading aloud and reading silently in this section would have been greater.

b. A consideration of the test materials, in relation to the results yielded, does not indicate any major weaknesses. Statistical analyses were carried out to check this:

i. An important question is whether the tool used for measurement of comprehension was suited to its purpose. The type of test used here goes back to Thorndike's experiments earlier this century and has been widely used since then. The multiple-choice questions must be constructed with great care to ensure that they test precisely what was intended (whether it is a point of grammar or a whole idea) and that extraneous clues to the right answers are not inadvertently included. The broader issues of language testing cannot be discussed here and the specific question of the appropriateness of the

measuring instrument in this experiment must remain open in the absence of similar experiments using different methods of measuring comprehension. However, an item analysis of the comprehension questions (Appendix C) shows no imbalances which might have led to the large number, or particular distribution, of negative effects. Rather, they seem to have been well constructed for their purpose.

ii. As a further check on the appropriateness of the comprehension questions, Subjects' scores in these were correlated with scores in the cloze test, using the Kendall rank correlation coefficient (Kendall's Tau). The details were as follows: Tau had to exceed 0.31 for N=20 (i.e. 20 Subjects in this instance) for a significant agreement between the two orderings of the data at the $p = 0.05$ level. The value of Tau for this data was 0.4. This shows a significant positive correlation between the two variables, that is between cloze and comprehension test results. Since the cloze test is generally accepted as an objective index of general language proficiency, it may be inferred that the comprehension questions were suitable for this level of proficiency and for these questions.

iii. The pre-test revealed no significant gaps in the Subjects' knowledge of the relevant vocabulary. An item analysis of the pre-test (Appendix C) shows no weaknesses of item construction which might have affected comprehension scores. In only two out of the fifty seven items did a majority of Subjects select a particular wrong option and in neither of these cases was the tested word relevant to a comprehension question. The pre-test was intended solely for information in analysing results and not as a measure of proficiency. To confirm this, Subjects' scores

were correlated with their scores in the comprehension questions, again using Kendall's Tau. As expected, there was no significant correlation between the variables.

c. Subject behaviour provides a more likely source of explanation for unexpected results than either experiment design or test materials. The ratio of 12:4:4 (Table VII) for positive, negative and no effect shows that, although more than half the Subjects do comprehend more in silent reading, a substantial number (20%) comprehend less and an equally substantial number show no bias. In the absence of faulty experiment design or test materials, we must conclude that the first hypothesis should be modified in a minor way. It should be reformulated to allow for the readers to whom it does not apply, thus: for most readers, there is a semantic deficit in reading aloud, as compared with silent reading.

Other issues of interest pertaining to Subject performance may be mentioned at this point.

i. Pronunciation difficulties

A selection from the tape-recorded readings was made on the basis of comprehension scores to see whether there was any correlation between fluency of reading, including accuracy of pronunciation, and level of comprehension. Subjects X5 and X10 were selected because they had each scored one very high and one very low mark in the comprehension tests following reading aloud: in neither case did good reading correlate with good comprehension.

The reading of passage C by X5 and X4 was compared, as they had scored the same in this case: there was no correlation between the quality of pronunciation or fluency and the scores, as X4 was markedly superior to X5.

The reading of passage E by Y2 and Y7 was compared,

since Y2 had a low and Y7 a high score: both passages were read well, again indicating a lack of correlation between reading fluency and quality of comprehension. All the recordings of passages read by X1 were studied, as this Subject had low scores in all the comprehension tests: the quality of reading throughout was good.

From this sampling it is clear that greater fluency in reading aloud does not necessarily imply a concomitant better comprehension. In relation to the first hypothesis, therefore, we may infer that it is the fact of rather than the proficiency in articulation that is the important factor.

It was observed too that the difficulties of pronunciation encountered were those of native speakers of French and had no effect on the comprehension scores of these Subjects.

ii. Reading speed and comprehension

Taking a cue from the claims of 'speed reading' courses, it was decided to investigate whether greater speed of silent reading correlated with better comprehension. Kendall's Tau was used as an appropriate measure: there was no positive correlation. The explanation for the greater efficiency (in the sense of better comprehension) of silent reading cannot, therefore be said to lie in the fact that it is accomplished at a greater speed. (Efficiency in the sense of quantity read is of course a different issue.)

iii. Subvocalization in the silent reading

As it is not possible to observe subvocalization visually (except in the grosser form when it involves lip movements, which none of the Subjects indulged in), it may be conjectured that the unexpectedly large

number of negative and no effects might have resulted from this in the following way. While these Subjects are relatively advanced foreign learners of English, they may yet be at a level at which rapid silent reading overloads the processing power of their particular transitional competence. Slowing down the reading process, as in reading aloud, may allow more comprehension. Subvocalization, or 'silent articulation', would have the same slowing down effect and would therefore allow better comprehension. In turn this would equalise the scores for reading aloud and reading silently and would account for the pattern of C/E effects. This explanation might have been tempting had there been any correlation between reading speed and comprehension (which was not the case, as demonstrated by the analysis using Kendall's Tau), and had the A/B effects been equalised as much as the C/E.

iv. Variations in concentration

The test results and comments made by the Subjects about their preferred mode of reading indicate a great degree of individual variation. In particular, it seems possible that, in the somewhat artificial situation of a reading test, concentration will vary. The degree of concentration will naturally affect comprehension. While some Subjects (e.g. Y2) claimed to be able to understand more when reading aloud, their performance did not bear out their own intuitions. (Their performance on the particular day of the test could have been untypical, but it was not possible to investigate this factor within the limitations of time and scope of this experiment.) Most Subjects claimed to be able to understand more in the silent mode, both in their native language and in English. Their results confirmed these intuitions in regard to the foreign language.

In addition to the problem of the artificiality of test conditions, there exists an 'audience factor' which may affect concentration, again causing individual variations in performance. Reading aloud assumes an audience, silent reading does not. This will affect Subjects in different ways according to personality, a factor not measured in this experiment and difficult to measure in any circumstances. Some would be less confident than others because of the listener and concentration on meaning would therefore be affected to different degrees. Equally, the lack of an audience in the silent mode could make certain types of Subject relax their concentration.

The larger the number of Subjects tested, the less will individual variations in concentration affect the outcome in terms of statistical probability. The sample size of this experiment was large enough to accommodate such variations.

2. DISTRIBUTION OF EFFECTS

Table III shows that there were more negative and no effects in C/E than in A/B and more positive effects in A/B than in C/E. In terms of testing the hypothesis, these pairs of reading tests were designed as separate units, but it is interesting to speculate as to the reasons for this distribution of effects. The only differences between the pairs were in length (C/E longer) and style (A/B expository, C/E narrative). There seems to be no reason why length should be an influence, whereas it is generally easier to remember an exciting narrative at first reading than an exposition of facts. We may tentatively conclude that the level of comprehension of a passage will depend in part upon the manner in which it is written, and that this factor must be considered together with the mode (aloud or silent) of reading. From this experiment the evidence for this conclusion is not strong enough, however, to warrant a further

modification (perhaps along the following lines: for most readers of texts written in an expository style there is a semantic deficit...etc.). This would depend upon the results of a separate experiment using a series of texts equalised in every respect other than style.

Table III also shows that there were more positive effects in Group X than in Group Y (10:7), but since it is not a very great difference and since Subjects were randomly assigned to Group X and Y, this may be regarded as the result of chance.

3. READING PASSAGE D

This passage was retained and read silently by all Subjects to provide a different perspective on C and E, which were parallel to D in every way except level of frequency of vocabulary (approximately 11½% 'non-West' words in D; approximately 3½% 'non -West' words in C/E). It is apparent from the comprehension scores for D that it was more difficult to understand. The average for this test was even lower than the overall average for reading aloud and much lower than that for the almost parallel silent reading. The averages out of five were:

D (silent) : 2.55
C/E aloud : 2.675
C/E silent : 3.275

These results confirm the expectation that a passage with relatively less frequent vocabulary will be harder to comprehend. More importantly for the purposes of this experiment, they provide additional support for the view that all the relevant independent variables in the C/E reading passages and comprehensions were adequately controlled.

Section VII CONCLUDING REMARKS

The models of reading discussed in Section II may be now related in turn to the experiment. It should be remembered that, although the following remarks refer to readers in general, the Subjects of the experiment were foreign language learners. Their processing sequences in reading are not necessarily parallel to those of native speakers and their particular transitional competences do not necessarily equate with stages in native speakers' reading development.

1. THORNDIKE

Thorndike's idea of 'reading as reasoning' is implicitly accepted in the experiment through the use of a particular type of reading test: the short passage followed by comprehension questions. Thorndike does not address himself to the issue of decoding through sound in the reading process. (It would not have been regarded as an issue in the earlier part of the century.)

2. BEVER AND BOWER

In distinguishing between visual and auditory readers, Bever and Bower cite certain experiments which seem to indicate that a minority of readers (8%) are 'naturally' visual. While they refer only to silent reading in their discussion, it is interesting to speculate whether there is any connection between their visual readers and those in the experiment who were biased towards silent reading. Or, stated in the other direction, we may speculate whether their auditory readers are linked as a group to those in the experiment who do not seem to be hindered in comprehension by having to read aloud. Such links, however, remain at the level of speculation, as there are major differences between this experiment and those cited by Bever and Bower. As to our general theme, it is clear from the earlier discussion, and their concept of 'auditory' readers, that Bever and Bower accept the idea of mediation through sound,

or at least mediation through the more abstract levels of sound in the language system.

3. SMITH

As stated in an earlier section, at the end of the discussion of Smith's model, the experiment indicates that we should not regard articulation in reading aloud as something which is simply tacked onto the end product of a direct decoding sequence. Rather, it indicates a strong link between articulation and processing of meaning. To say that articulation is the definite cause of the semantic deficit in reading aloud would be too absolute, but the controlled experiment points in that direction. Smith would possibly counter the implications of the experiment by saying that its results cannot be generalised to native speakers or that it is divided attention alone which causes the decreased comprehension of reading aloud.

Although the experiment did not set out to test the direct decoding hypothesis, the link established between articulation and semantic processing does not help to support it. Instead, it tends to support the view that the various levels of language are closely integrated, or at the very least that they influence each other, in reading as in speech. (For evidence on multi-level decoding in speech, we may refer to articles by Fry, who presents a model of speech processing, and Liberman,[32] who provides an account of research in the same field carried out at the Haskins Laboratories.)

4. GOODMAN

Statements made by Goodman concerning speed and efficiency in the two modes of reading provided the basis of the hypotheses tested and borne out in the experiment, and discussed in detail in sections V and VI.

Goodman, whose general approach is more subtle and plausible than Smith's, usefully distinguishes stages of development in

reading which relate in different ways to mediation through sound. At the oral and aural stage such mediation is necessary, but it is dismissed in the later, silent reading, stage. In respect of the latter he agrees with Smith and it is here that one may take issue with both of them. As suggested in earlier sections, the case against decoding to sound is not proven. Rather, there exist good arguments in favour of it, in particular the well-established and close links between written and spoken symbols in alphabetically written languages such as English.

Implications for the Teaching of Reading

It was observed in the Introduction that little research on reading has been directed towards an assessment of the comparative values of reading aloud and silent reading and that reading pedagogy in schools ignores silent reading skills (scanning, search reading, skimming, receptive reading and responsive reading).[33] Yet it is clear from the results of the experiment that there are important differences between the two modes of reading in regard to how much meaning each yields. It is also clear that within each mode there will be variations governed by the reader's purpose. Further research in these areas and a greater awareness of them in education would do much to improve the effectiveness of reading instruction.

APPENDIX A : TEST MATERIALS

From each group of four French words or phrases (a, b, c or d), choose the one which is closest in meaning to the underlined English word or phrase in the sentence.

---

1. He was the <u>founder</u> of the country.
   a. explorateur b. fondeur c. fondateur d. organisateur

2. The poet was <u>inspired</u> by nature.
   a. attiré b. déçu c. animé d. aspiré

3. The farmer was an <u>unlearned</u> man.
   a. savant b. paresseux c. peu intelligent d. illettré

4. George <u>resembles</u> his brother.
   a. est différent de b. est pareil à c. aide d. déteste

5. The priest had a <u>spiritual</u> attitude to life.
   a. poétique b. excentrique c. étrange d. religieuse

6. Einstein's <u>theory</u> was accepted.
   a. système b. idée c. problème d. thèse

7. Music was his <u>inspiration</u>.
   a. source de plaisir b. passe-temps c. source de souffle créateur d. métier

8. Racine was a true <u>genius</u>.
   a. un homme qui construit des ponts b. un homme qui est un bon ingénieur c. un homme avec aptitudes extraordinaires d. un homme qui n'a aucun talent

9. They <u>circulated</u> many pamphlets.
   a. éditèrent b. firent circuler c. écrivèrent d. imprimèrent

10. The church regarded him as a <u>blasphemer</u>.
    a. un homme qui trahit sa parole b. un homme qui outrage la religion c. un homme qui commet des péchés d. un homme qui est saint

11. John was happy to join the <u>Brotherhood</u> of Peace.
    a. Ecole b. Eglise c. Fraternité d. Armée

12. The <u>bagpipe</u> is the national musical instrument of Scotland.
    a. accordéon b. violon c. cornemuse d. trompette

13. The camel and the dromedary are <u>similar</u>.
    a. petits b. semblables c. méchants d. identiques

14. He was promoted because he was a good <u>administrator</u>.
    a. artiste b. chef c. travailleur d. organisateur

15. Peter was a <u>brilliant</u> student.
    a. assidu b. excellent c. gentil c. médiocre

16. She dislikes naughty children.
a. déteste b. se soucie de c. aime d. enseigne

17. He adjusted his hat.
a. ôta b. nettoya c. arrangea d. poussa

18. Sulphuric acid is a dangerous chemical.
a. liquide b. produit chimique c. minerai d. pierre

19. The denoument was very dramatic.
a. plaisant b. agréable c. émouvant d. horrible

20. The mistake was unfortunate.
a. heureuse b. plaisante c. malencontreuse d. terrible

21. The accident was awful.
a. terrible b. fatal c. bénin d. sans conséquence

22. He felt no pity for those who suffered, because of his insensitivity.
a. absence de sensibilité b. intelligence c. sensiblerie
d. timidité

23. He redoubled his efforts to pass the examination.
a. abandonna b. fit c. intensifia d. diminua

24. The old man was given a pension.
a. livre b. cadeau c. retraite d. bourse

25. She snatched the book from him.
a. retira b. prit c. arracha d. demanda

26. The doctor took his stethoscope to the hospital.
a. patient b. malade c. thermomètre d. appareil médical

27. The patient left the surgery.
a. école b. maison de retraite c. dispensaire d. endroit

28. The loss of the 'Titanic' was a disaster of major proportions.
a. insignifiant b. sans précédent c. terrible
d. sans conséquence

29. The problem requires a good explanation.
a. introduit b. annonce c. implique d. exige

30. There was an alert before the bomb exploded.
a. couvre feu b. annonce c. avertissement d. feu

31. There was much agitation amongst the crowd.
a. angoisse b. bruit c. crainte d. effervescence

32. He had been working under strain.
a. surmenage b. drogue c. train d. soulagement

33. In case of emergency, they must leave the building.
a. catastrophe b. accident c. agitation d. urgence

34. They worked well in a team.
a. firme b. groupe c. équipe d. usine

35. The horse began to <u>trot</u>.
a. aller à petits pas rapides b. aller en courant
c. aller au galot d. aller en sautant

36. The fire was a <u>disaster</u>.
a. un incident b. une catastrophe c. une occasion plaisante
d. un accident douloureux

37. His manner was always <u>abrupt</u>.
a. surprenante b. polie c. direct d. en souplesse

38. The inspector led the <u>investigation</u>.
a. procès b. enquête c. expertise d. accusé

39. The public <u>transport</u> in Grenoble is very good.
a. organisation de la circulation b. organisation des bus
c. installations pour le stationnement d. voies de circulation

40. Some newspapers exist on <u>sensationalism</u>.
a. affaires de politique etrangère b. littérature pornographique
c. exaggérations qui font impression sur le public
d. mensonges destinés a affaiblir le gouvernement

41. The power of the <u>media</u> is increasing.
a. moyens hospitaliers b. groupes financiers internationaux
c. moyens d'information de masse d. moyens de transport

42. The <u>incident</u> was soon forgotten.
a. grave accident b. évènement c. blessure mortelle
d. intervention désagréable

43. The tax inspector <u>pursued</u> him for the payment.
a. lui téléphona b. l'ennuya c. le félicita d. le harcela

44. He produced <u>evidence</u> in court.
a. témoignage b. jugement c. preuves d. documents

45. He appealed to the <u>authorities</u>.
a. les représentants du pouvoir b. les organisations sportives
c. les adjoints de la mairie c. la police de la commune

46. He was very <u>vague</u> about the true facts.
a. détaillé b. géné c. imprécis d. enthousiaste

47. The whole affair is <u>absurd</u>.
a. intéressante b. déraisonnable c. accablante d. abusive

48. He was an <u>ardent</u> supporter of the club.
a. courageux b. paresseux c. tiède d. fougueux

49. The <u>inauguration</u> of the bishop took place last year.
a. élection b. décision c. intronisation d. déménagement

50. He was an <u>imperturbable</u> man.
a. silencieux b. triste c. exitable d. impassible

51. He was a very good <u>student</u>.
a. ouvrier b. étudiant c. élève d. travailleur

52. John did not want to <u>oversleep</u>.
a. dormir à poings fermés b. être dormeur c. dormir debout d. dormir au delà de son heure

53. She was interested in singing as a <u>career</u>.
a. emploi b. profession c. passe-temps d. marotte

54. They did not think about the <u>consequence</u> of that action.
a. commencement b. durée c. suites d. continuation

55. The soldier knew that the battle would <u>inevitably</u> be lost.
a. avec souffrance b. peut-être c. sans doute d. inexcusablement

56. Her <u>social status</u> was regarded as very high.
a. acceptabilité sociale b. études sociales c. activité sociale d. travaux communals

57. She was <u>unable</u> to climb the ladder.
a. inaccoutumée b. incertaine c. indécise d. incapable

- A -

George Fox, founder of the Society of Friends, was, like Bunyan, an unlearned man inspired by the Bible. It is not Bunyan, however, whom George Fox seems most to resemble. His true brother in spiritual matters is St. Francis of Assissi. What George Fox learned from the Bible was practice rather than theory. His followers were called 'Friends' and men and women stood on equal terms. George Fox had one of the sure marks of genius: he was a great organiser; and the Society rose to great heights because of his inspirations, covering England with its influence, and circulating quantities of printed matter in spite of opposition from the government. So completely practical was Quaker Christianity that even blasphemers preferred to deal with Quaker tradesmen, who were always very honest.

- B -

Andrew Lang, President of the Brotherhood of International Bagpipe Players, was, like Robert Burns, an intelligent man moved by patriotism. It is not Burns, however, to whom he is most similar. His true equal in musical ability is Wolfgang Amadeus Mozart. The members of the association were called 'Brothers', but they firmly believed in equality between men and women. Andrew Lang certainly had one of the outstanding qualities of the truly intelligent: he was a wonderfully capable administrator; and the Brotherhood made great progress under this brilliant artist, covering the world, wherever Scotsmen had settled, and providing similar associations with written music which would astonish listeners because of its beauty. So perfectly practised were the members in their art that even people who disliked the bagpipes would praise their skill.

- C -

Professor Hamish McDougall picked up the box of instruments and rushed out of the room. He knew that, if he didn't reach his laboratory at the right moment to adjust the temperature, the extra mixture of strong chemicals would explode and cause a fire. He did not care to think of the possible damage to the building, and especially to the rooms on the south side, which would result from his neglect. The thought made him run even faster towards the lane. The consequence of such a dramatic, highly unfortunate ending to his important, carefully planned series of experiments would be so awful that the thought made him tremble. All the newspapers in the country would have photographs of the damage on their front pages under sensational headlines. And all their photographers, whose insensitivity was well known, would run after him in the streets to try to get pictures for their stories, Though he was a brave man, the Professor's face reflected his fear that he would possibly be unable to exchange information with scientists in other countries. He redoubled his speed as he hastened across the main road towards the lane and wondered whether he would get any assistance or sympathy from his employer after the accident. Or would he be dismissed and put on a pension after such a grave neglect of scientific duty?

- D -

Dr. Henry Rixton snatched up his bag, made sure the stethoscope was in it, and hurried out of the surgery. He was certain that it must be an accident of major proportions that would require this type of general alert. He hated to think that it might be yet another railway accident which was the cause of the agitation, particularly because of the excessive strain emergency rescue teams had recently been working under. The thought made him break into a trot at the exit of the building. The outcome of such a national disaster had in the past always been an abrupt official investigation into arrangements for safety in the transport system. The news media throughout the land would as usual seize upon the incident for their front pages and terrible sensationalism. And their reporters would make accusations against the administration of the railways and would pursue anyone for evidence against the authorities. Vague and absurd stories would of course be told. Dr. Rixton was sad, also, that his ardent wish to attend the dinner that evening, at the inauguration of the president, might have to be forgotten. He ran faster as he neared the car, where Dr. Robertson, imperturbable as ever, was waiting for him. They set out in the direction that had been indicated to them when the warning had first been given.

Rory Thwaites, a student at Oxbridge College, was in a panic. He was quite sure that he had overslept and would therefore be late for the examination that he had been so concerned about for so many months. He felt ill at the thought of the consequences that would follow inevitably from doing badly in this important examination and influence his newly planned career. This anxiety made him run towards his bicycle. Such an ending to so many years of difficult work performed at such a great cost in effort would be a personal defeat. His student friends and his near and distant relatives would be quite sympathetic, naturally, but would enjoy having something out of the ordinary to discuss over their endless cups of coffee and tea. They would all remember that he had frequently failed in his duties in the past and would say that he was again showing his lack of responsibility. This double threat to his career and to his social status was like a bad dream and it made him ride at high speed. Rory was not usually calm in times of great difficulty and these fears made him almost unable to think. As he turned the last corner near the examination hall, he looked up at the church clock. He had made it, with only a minute to spare!

Comprehension - A -

From each of the following groups of four options, choose the one which you think is closest in meaning to the idea expressed in the passage you have just read.

1. (a) Fox and Bunyan were both learned and inspired by the Bible.
   (b) Both Fox and Bunyan were unlearned and inspired by the Bible.
   (c) Fox, who was unlearned and inspired by the Bible, was unlike Bunyan.
   (d) Both Fox and Bunyan were learned, but were inspired by the Bible.

2. (a) Spiritually, Fox and Bunyan resemble St. Francis.
   (b) Spiritually, Bunyan is similar to St. Francis.
   (c) Bunyan has more in common with St. Francis than with Fox, in spiritual matters.
   (d) Fox has more in common with St. Francis than with Bunyan, in spiritual matters.

3. (a) Fox found practice rather than theory in the Bible.
   (b) Through the influence of Biblical theory, Fox became very famous.
   (c) Fox was much more interested in Biblical theory than in practice.
   (d) The Bible had little influence on Fox's behaviour.

4. (a) The growing spirituality of the Society of Friends shows that Fox was a genius.
   (b) Fox was clearly a genius, because he inspired the Society of Friends to oppose the government.
   (c) Fox was clearly a genius, because he had such great powers of organisation.
   (d) The widespread and rapid circulation of printed matter, in spite of opposition from the Society, demonstrates Fox's genius.

5. (a) Quaker tradesmen refused to deal with dishonest blasphemers.
   (b) Quaker tradesmen preferred to deal with honest blasphemers.
   (c) Even blasphemers preferred to deal with Quaker tradesmen.
   (d) Even blasphemers refused to deal with Quaker tradesmen.

Comprehension - B -

From each of the following groups of four options, choose the one which you think is closest in meaning to the idea expressed in the passage you have just read.

1. (a) Lang and Burns were both intelligent and patriotic.
   (b) Lang, unlike Burns, was intelligent but not patriotic.
   (c) Both Lang and Burns were unpatriotic.
   (d) Lang, like Burns, was unintelligent.

2. (a) In musical ability, Lang and Burns resemble Mozart.
   (b) In musical ability, Burns is similar to Mozart.
   (c) Lang has more in common with Mozart than with Burns, in musical ability.
   (d) Burns has more in common with Mozart than with Lang, in musical ability.

3. (a) Lang called his companions 'Brothers' because he did not firmly believe in equality between men and women.
   (b) Lang called his companions 'Brothers', but he believed firmly in equality between men and women.
   (c) Lang and his associates did not believe that men and women were equal and so called themselves 'Brothers'.
   (d) Lang and his associates called themselves 'Brothers' because they did not believe in women playing the bagpipes.

4. (a) The progress of the Brotherhood shows that Lang was truly intelligent.
   (b) Lang was truly intelligent, because he was patriotic.
   (c) Lang was a wonderfully capable administrator, which showed that he was truly intelligent.
   (d) The provision of musical scores for similar associations showed that Lang was truly intelligent.

5. (a) People who disliked the bagpipes were reluctant to praise the skill of the members.
   (b) People who disliked the bagpipes were happy to praise the skill of the members.
   (c) People who disliked the bagpipes refused to praise the skill of the members.
   (d) People who disliked the bagpipes rushed to praise the skill of the members.

Comprehension -C-

From each of the following groups of four options, choose the one which you think is closest to the idea expressed in the passage you have just read.

1. Professor McDougall was in a hurry because
   a. he wanted to reach the dangerous explosion.
   b. he had been urgently summoned to the laboratory.
   c. he wanted to prevent a dangerous experiment.
   d. he wanted to prevent a dangerous explosion.

2. a. The danger had been caused by Professor McDougall's neglect of duty.
   b. The danger had been caused by Professor McDougall's accident.
   c. The strong chemicals at a high temperature had caused the danger.
   d. The mixed chemicals at a low temperature had caused the dangerous situation.

3. If there was an accident
   a. the newspapers would be sensationally interested.
   b. the journalists would be sensationally interested.
   c. the newspapers would treat it in a sensational manner.
   d. the journalists would try not to make it seem sensational.

4. a. The Professor was not always brave, but was so now.
   b. The Professor was usually a brave man, but he was afraid now.
   c. The Professor was not always fearful but was especially so now.
   d. The Professor was trying to be brave now, as he usually was.

5. a. Professor McDougall guessed that he would be put on a pension after the accident.
   b. Professor McDougall worked out that he would be put on a pension after the accident.
   c. Professor McDougall wondered whether he would be put on a pension after the accident.
   d. Professor McDougall was certain that he would be put on a pension after the accident.

Comprehension - D -

From each of the following groups of four options, choose the one which you think is closest to the idea expressed in the passage you have just read.

1. Dr.Rixton was in a hurry, because
   (a) he wanted to escape from the surgery.
   (b) he had been summoned by another doctor
   (c) he had been called through a general alert.
   (d) he was hunting for his stethoscope.

2. (a) There had been another railway accident, requiring the emergency rescue teams.
   (b) He hoped it was not another railway accident, as the emergency rescue teams had recently been overworked.
   (c) The emergency rescue teams were under strain and did not want to work any harder.
   (d) The emergency rescue teams were under strain and could not work on another railway accident.

3. If there was an accident
   (a) the newspapers would conduct an official enquiry.
   (b) the newspapers would not be interested.
   (c) safety margins would be increased.
   (d) there would be an official enquiry.

4. Reporters would
   (a) support the railway administration in the event of an accident.
   (b) make clear statements about the railway administration in the event of an accident.
   (c) criticise the railway administration in the event of an accident.
   (d) write true accounts in the event of another railway accident.

5. (a) Dr. Rixton was sad that he would be unable to attend the dinner, as Dr. Robertson would be there.
   (b) Dr. Rixton was keen to attend the dinner at the inauguration of the president.
   (c) Dr. Rixton was keen to attend the dinner, where Dr. Robertson would be inauguarated as president. 72
   (d) Dr. Robertson, imperturbable as ever, was keen to attend the dinner.

Comprehension - E -

From each of the following groups of four options, choose the one which you think is closest to the idea expressed in the passage you have just read.

1. Rory Thwaites was in a panic because
   a. he had been worried about the examination for many months.
   b. he had overslept.
   c. he thought he might miss his examination.
   d. he wanted to take the examination.

2. Rory felt ill because
   a. he thought he might do badly in the examination.
   b. he was afraid of the consequences of missing the examination.
   c. he would inevitably do badly in the examination.
   d. he had planned a new cateer, which was now in danger.

3. It would be a personal defeat for Rory
   a. if his friends discussed his new failure.
   b. if he did badly in the examination.
   c. if his friends and relatives were to remember his past failures.
   d. if his years of study ended in his missing the examination.

4. It was like a bad dream to Rory
   a. that both his career and social status should be threatened.
   b. that his social status should be threatened.
   c. that his career should be threatened.
   d. that he might miss the examination.

5. In times of difficulty Rory
   a. was not usually calm.
   b. was unable to think.
   c. was neither calm nor able to think.
   d. would ride at high speed.

In each blank space write one word which is both meaningful (makes good sense) and grammatical. As an example, the first one has been done for you.

The mystic is commonly impelled _____ to make known to _____ his experience of God _____ the soul, and early _____ literature, therefore, is the _____ of a spiritual conflict _____ than the assertion of _____ creed. George Fox's Journal _____ by far the most _____ of all these records. _____ has hardly a rival _____ religious literature of its _____. Yet it has no _____ form and was, for _____ most part, dictated. It _____ first put into grammatical _____ by Thomas Ellwood and _____ Friends, but the original _____ now been published verbatim _____ there is a useful _____. It has a penetrating _____ simplicity which goes straight _____ the heart of the _____. Whether his story be _____ or horrible, George never _____ his voice to shrillness _____ protestation or complaint. Some_____ the vignettes, as we _____ call them, that illustrate _____ narrative make unforgettable pictures. _____ the whole book is _____ moving.

APPENDIX B

CORRECT ANSWERS FOR TESTS

Pre-test	1.c	2.c	3.d	4.b	5.d	6.d	7.c	8.c	9.b
10.b	11.c	12.c	13.b	14.d	15.b	16.a	17.c	18.b	
19.c	20.c	21.a	22.a	23.c	24.c	25.c	26.d	27.c	
28.c	29.d	30.c	31.d	32.a	33.d	34.c	35.a	36.b	
37.c	38.b	39.b	40.c	41.c	42.b	43.d	44.c	45.a	
46.c	47.b	48.d	49.c	50.d	51.b	52.d	53.b	54.c	
55.c	56.a	57.d							

Comprehension Tests	A	1.b	2.d	3.a	4.c	5.c
	B	1.a	2.c	3.b	4.c	5.b
	C	1.d	2.a	3.c	4.b	5.c
	D	1.c	2.b	3.d	4.c	5.b
	E	1.c	2.b	3.d	4.a	5.a

Cloze Test The original words were, in test order:
others, in, Quaker, record, rather,
a, is, noteworthy, it, in, kind,
literary, the, was, form, other, has,
and, abbreviation, fervent, to, reader,
gentle, raiser, of, of, may, his,
indeed, deeply.

APPENDIX C

ITEM-ANALYSES

Note: numbers refer to wrong selections only

Pre-test

	a	b	c	d
1.	2			2
2.	12			3
3.			2	
4.				1
5.	1		1	
6.	2	3		
7.	2	2		
8.				
9.	3			1
10.	2		1	
11.	1	1		1
12.				
13.				2
14.		1		
15.	2			
16.				
17.	1			
18.	1			
19.				10
20.				
21.		1		
22.				
23.				
24.				
25.	3			
26.				
27.				
28.		11		
29.			1	
30.	2	2		
31.		1	1	
32.		1		
33.	1	2		
34.		1		
35.				1
36.				
37.	9			
38.				
39.	2			
40.				
41.		1		
42.				6
43.		1		
44.	2			
45.			3	
46.				
47.				3
48.				
49.	7			
50.				
51.			1	
52.	1			
53.	1			
54.				
55.				1
56.			9	
57.				

Comprehension Tests

		a	b	c	d
A	1.	2		11	
	2.	2	2	3	
	3.		3	5	1
	4.	2	1		10
	5.	5	3		3
D	1.	2	1		3
	2.				7
	3.	12		1	
	4.		3		5
	5.	8		5	1

		a	b	c	d
B			5	2	
	1.	1	5		4
	2.				1
	3.				1
	4.				1
	5.	3		1	
E			10		
		2		1	3
			1	4	
				6	1
			6	5	3

		a	b	c	d
C				1	
				11	1
		2	5		1
		1		4	3
		2	1		2

APPENDIX D

EXAMPLE OF TEST PROCEDURE (GROUP X)

1. Student writes down personal information as follows:
   name, number of years learning English, total time spent in English-speaking countries.
2. Purpose of experiment explained.
3. Pre-test explained, and administered (timed).
4. Passage A read aloud. Tape recorded and timed.
   Intervening task: write one sentence in English.
   Answer comprehension questions (timed).
5. Practise moving card down page to cover preceding during silent reading.
6. Passage B read silently (timed).
   Intervening task: write one sentence in English.
   Answer comprehension questions (timed)
7. C read aloud (then as for 4. above)
8. D read silently (then as for 6. above)
9. E read silently (then as for 6, above)
10. Cloze test administered (timed)
11. Passages B, D and E read aloud and tape recorded.

For a Subject in Group Y, the stages are the same, except for:

4. Read B aloud
6. Read A silently
7. Read E aloud
9. Read C silently
11. A, D and C read aloud and tape recorded.

APPENDIX E

NOTES ON STATISTICAL TECHNIQUES USED

THE SIGN TEST is applicable to the case of two related samples when the experimenter wishes to establish that two conditions are different. The different pairs may be from different populations with respect to age, sex, intelligence, etc.; the only requirement is that within each pair the experimenter has achieved matching with respect to the relevant extraneous variables... One way of accomplishing this is to use each subject as his own control. The test uses plus and minus signs rather than quantitative measures as its data. (Siegel (1956), p. 68)

THE WILCOXON MATCHED-PAIRS SIGNED-RANKS TEST utilises information about the relative magnitude as well as the direction of differences within pairs. It gives more weight to a pair which shows a large difference between the two conditions than to a pair which shows a small difference. (Siegel (1956), p. 75)

THE KENDALL RANK CORRELATION COEFFICIENT, TAU, is suitable as a measure of correlation if at least ordinal measurement of both the X and Y variables has been achieved, so that every subject can be assigned a rank on both X and Y. Tau will give a measure of the degree of association between the two sets of ranks. The sampling distribution of Tau under the null hypothesis is known, and therefore Tau is subject to tests of significance. (Siegel (1956), p. 214)

APPENDIX F

NUMBERS		SUBJECTS	SCHOOL
X	1	Anglade, M-P.	Studio School
	2	des Aubrys, M.	Jarrett School
	3	de Brauwere, B.N.	Lennox-Cook School
	4	Courvoisier, I.	Davies's School
	5	Genequand, F.	Davies's School
	6	Leclerc, M.	Lennox-Cook School
	7	Locci, V.	Studio School
	8	Loyer, V.	Anglo-World Language Centre
	9	Pavilla, C.H.	Jarrett School
	10	Vankemmel, P.	Anglo-World Language Centre
Y	1	Courtemanche, S.	New School
	2	Enaut, L.	Newnham Language Centre
	3	Fleri, L-F.	Brookside School
	4	Fresuet, G.	New School
	5	Hatt, L.	Studio School
	6	Legras, E.	Newnham Language Centre
	7	Mordret, S.	Lennox-Cook School
	8	Moy, A.	Brookside School
	9	Nobels, M-E.	Lennox-Cook School
	10	Rappard, O.	Lennox-Cook School

NUMBER OF SUBJECTS FROM EACH SCHOOL:

Anglo-World	2
Brookside	2
Davies's	2
Jarrett	2
Lennox-Cook	5
Newnham	2
New	2
Studio	3
	20

APPENDIX G

SUGGESTIONS FOR FURTHER RESEARCH

The experiment described above could usefully be replicated with a larger number of Subjects, to provide a greater probability of statistical validity.

The modification required for Hypothesis I indicates that there could be an investigation into why it is that in a large number of cases silent reading is not in fact conducive to better comprehension. The particular question to be answered is whether individual reading strategies differ according to personality and/or learning styles.

Further experiments could include balanced samples of both native speakers and foreign language learners, to observe whether there are any differences in their reading behaviour.

Language users at differing levels of proficiency could be compared, especially since Goodman draws a distinction between the processing strategies of beginners, semi-proficient and proficient readers.

The effect of different styles of writing on reading strategies and comprehension could be investigated (i.e. comparative 'readability' of styles).

Reading miscue analysis could be carried out on data derived from controlled experiments, to investigate the validity of Goodman's procedures for this type of analysis (e.g. using the tape-recorded readings of the forty test units obtained in this experiment.)

SUGGESTIONS FOR FURTHER RESEARCH (continued)

Cloze-testing and Reading Comprehension: the experiment shows a significant correlation between these, and further investigation could determine whether cloze-testing is in itself a satisfactory measure of reading comprehension.

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